CORTIM Project: Medical Regulation Concept Designed for Forward Field Casualty Management Based on an Information System

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ABSTRACT

CORTIM's aim is to give to the Armed Forces Medical Service (SSA) with an information system a real-time medical data management capability by integrating that data into the operational situation to enhance human and technological performance on the battlefield. Ideas developed around elements of the CORTIM project, and numerous field trials have led to an innovative concept in the business of casualty management by the SSA: The Theatre Medical Control System (RMT). The term of 'medical control system' is justified by the fact that at each stage of the process a Medical Officer (MO) assesses each new casualty on the basis on the data provided in order to organise his evacuation and treatment in concert with the operational command. This MO-Controller is located at next higher echelon: in that way he has an overview of the group of units for which he has the medical responsibility. After analysis of the task, three control levels, corresponding to the three levels of processing and competence have been identified. Each level is called a 'phase', and relates to a specific level of competence. So in the first aid phase, the regimental MO decides the commitment of medical resources; in the 'forward medical aid' phase, the MO-Controller at the higher formation organise the most appropriate medico-surgical reception. Finally, in the 'strategic evacuation' phase, the MO-Controller at national level bids for air transport support and prepares reception at the base hospital. The CORTIM project and the RMT concept form the basis of a forward medical information system integrated into the 'digital bubble' developed by the Digitisation of the Battlefield (NEB). Developed in the hearth of a regiment, at the cross roads of tactical and medico-logistic problems, the CORTIM project is the concrete example of the initiative undertaken by medical officers of SSA to digitise the CASEVAC chain in overseas theatres in liaison with the French armaments agency (DGA) and the single service staffs. Our studies were influenced by experience of crisis situations in the case of CORTIM, and the quality of casualty handling by the SAMU (the French Mobile Emergency Medical Service) for the RMT concept. We consider that operational casualty management can be enhanced in at least three areas. The first concerns improvements in the use of the available resources for managing casualties resulting from recent situations. This has led to a more effective assumption of responsibility, with a consequent improvement in prognosis for the casualty. The second relates to a better awareness of the context of a decision. Sharing between several decision-makers leads to greater awareness of the context. Effectively, each control operation is based on information transmitted by players in close proximity to the casualty. In our view this context-awareness limits errors of interpretation. Finally we can state that the RMT concept puts the emphasis on the casualty on an individual, and is therefore in tune with public expectations. At the conclusion of this study it would seem important to stress that the introduction of IT is not simply matter of technological problems, but can lead to major organisational changes.

Capability to accept casualties or, inversely, incapability amongst a various influential personalities, may or may not contribute to the success of military operations. This observation at a strategic level can be translated at tactical level as the management of the complete process of taking charge of casualties,

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requiring considerable resources. For thirty years, the loss ratio "dead / injured" has steadily declined. On the American soldiers, for example, this ratio increased from 1 / 10 to 1 / 20 between the Vietnam War and the second Iraq war. Thus, a strategic point of view, managing the care of wounded transaction is a decisive factor for the overall conduct of military operations. At operational level, the overall process of medical care requires many resources in manpower and equipment. However, the prognosis for serious injuries is related to rapid mobilization and the appropriate resources while restoring the operational capability of combat units also depends on the time of evacuation of wounded from the contact zone. The time factor seems to be one of the key elements of this support. In this context, a project to manage the operation and injured titled: Concept of Organisation for Collection and Transmission of Medical Data (CORTIM) was implemented. It is based on the premise that enhancement of information exchange could lead to a more appropriate sanitary means and thus improving the quality of care. This project resulted in the highlighting of a strong concept: the "Field Medical Control System" (RMT). It is part of the process of scanning the Battle space (NEB) whose principle is to take the advantage over the opponent by controlling information. The current missions are asking the military health service responsiveness increasingly important and the study CORTIM proposes a concept based on the scan to fit these new constraints.

1.0 CURRENT CHALLENGES

The conditions in which our troops deploy have evolved very rapidly in recent years. On the tactical level, operations are often Conflict control operations with low expected losses. However local crises can occur and generate spates of casualty, as was the case in Côte d'Ivoire in 2004. In War actions that our forces may have to incur, the risk that an influx of casualties may temporarily exceed the capacity of the medical chain, must be considered in the planning of the operation. The absorption of these peaks of activity is even more difficult to arrange that their occurrence is random. The risk creates a new constraint on forward field casualty management. Thus the medical support operation has been designed so far in terms of the collective interest because he had to save the greatest number. The mass treatment system inherited from the Cold War seems no longer appropriate. Indeed, currently losses are sporadic and in most circumstances, the individual prognosis may be preserved. Technologically, the new digital tools provide the possibility to share personal geolocation and circulate information, and secondly, to make available health facilities in country diagnostic facilities such performance as ultrasound and CT. In terms of expertise, lack of human resources in certain specialties such as neurosurgery or radiology could be partially compensated by using telemedicine. The new challenges of the Military Health Department are able to provide support in the operational status of a quality comparable to that provided to victims of trauma in the metropolis through the introduction of IT tools.

2.0 OPERATIONNAL FIELD CASUALTY MANAGEMENT

2.1 Today

To better highlight the contributions of CORTIM, we describe here two types of operation in Western armed forces.

The first operational management method is that of the *French Army* based on a four-phase chain: recovery, collection, triage and surgical treatment. To offer the best possible prognosis for each casualty help deal with the urgencies (unstable injuries) as soon as possible, the doctrine requires a pre-positioning means of a highly technical (forward medical and surgical teams). But the first determinant orientation is the triage at the surgical unit: the orientation of each injury is due at the yard, so late in the process with a 4-level categorization of emergency surgery. Throughout the evacuation chain, the data exchanged are essentially

quantitative in order to ensure a classic logistics management. Moreover, the military perspective, this management skill is logistics.

The second management method is based on a fundamentally different approach. The *U.S. Army* works on these basis. The "medics", that is to say, nurses specializing in emergency actions and the conditioning evacuation assigned to units deployed in theatre whose main mission is to evacuate all casualties as quickly as possible backwards. The term used to describe their modus operandi is: “Scoop and run”. They provide extraction resources as ambulance helicopters escorted by combat helicopter are planned. The exchange of information is here too, in a quantitative sense Logistics classic. The message used is brief and is called the *nine lines*. It merely expresses the operational constraints, being very succinct in the description of the casualty’s medical state.

So, whether for the *French Army* or *US Army* casualty management is a logistic problem. In the forward area, Americans stress logistic resources, when French emphasise the technical level of medical staff. The CORTIM project is intended to enhance the value of this human component "à la française" whilst optimizing logistics flows, thanks to IT.

2.2 The CORTIM Project

The CORTIM project ran from 2002 to 2006 and was financed by the Commission for the Development of Participative Innovation and trialled with the support of the 21 Marine Infantry Regiment. The “Price of audacity” wad awarded for the CORTIM project in November 2006. CORTIM is a conceptual study conducted from field observations. Its focus is the management of a mass casualty during combat engagements. CORTIM’s main aim is to give to the Armed Forces Medical Service (SSA) a real-time medical data management capability, by integrating these medical data in the operating situation to enhance human and technical performance on the battlefield. We should stress here on three aspects that the CORTIM project has brought to light:

- The concept of *saturating influx*
- Specifics aspects resulting from the use of medical data
- The technologies behind CORTIM.

Let us look first at this *saturing influx* concept. It is important to remember that this project is based on the analysis of real situations. By analyzing the four casualties influx managed by SSA since 1991 to 2006, the essential concept of localized losses, causing saturation, was highlighted. Previously, the chain comprised two states: a waiting state, in which the chain is on standby to receive casualties, and a state of crisis related to a large-scales influx of casualties throughout the chain. However, the analysis showed that, nowadays, serious incidents tend to be localized and that casualties were saturating only one part of the medical chain. It followed that the quality of management of this influx depends less of the number of casualties overall, but rather on the saturation at a point of the chain resulting from that influx. To better reflect the peak of activity induced by this situation, the number of injuries may be related to the capacity of available resources. The overload caused by the saturating influx results in a longer period preoperative, which has a direct impact on the prognosis of the patient. To summarise, the concept of *saturating influx* is linked to a situation where there is a temporary and localized overload in the medical chain. Surgical deadline, decisive for the individual prognosis can then be respected.

Secondly, the project focused on the *management of medical data.* CORTIM’s purpose is to allow the extraction of casualties preserving their prognosis. Processing medical data in a combat situation demands that

certain characteristics are taken into account. For example, the information format must be reduced to reduce the time needed to enter and transmit it. We used a semi-explicit coding that was tested in Sarajevo in 1994, condensing each item to a three letters code. In addition, to avoid memory lapses, and to allow comparison and synthesis of assessments, the drafting has been standardized using a rolling menu guaranteeing the transmission of data essential for casualty treatment. Menus are a guide, not a strait jacket, inasmuch as it is always possible to insert free text at every stage of the draft.

Finally, the CORTIM project has a strongly intentional element: *to be integrated into the NEB*. This will is not neutral. Indeed, at the institutional level, opting for NEB means drawing the SSA closer to the Army. Thus, from the beginning, it was decided not to develop a specific system, but to rely on an existing development. The declared aim of NEB is to create a digital bubble in which all the components (men and material) can communicate. Therefore, in a bubble digital cognition is distributed among the various elements within it and connected the term "digital tactical awareness bubble" has meaning. CORTIM will operate in this shared digital space. One point needs to be specified here: taking into account very early breaks in the information chain. Indeed, for various reasons, the system on which the casualty management is based can sometimes fail. Soldiers' lives cannot be entirely dependent on a system exposed to the severe constraints of combat Also, a total reversal was expected. This reversibility leads to several devices simulating the state of degradation of the system. For example, adhesive labels containing the medical information will be routinely published and applied to the casualty.

2.3 The Theatre Medical Control System (RMT)

Ideas developed around the basic elements of the CORTIM project and numerous field experiments have led to propose an innovative concept in the business of casualty management by the SSA: the RMT. The term “medical control system” is justified by the fact that at each stage of the process a Medical Officer (MO) assesses each new casualty on the basis of the data provided in order to organize the evacuation and treatment in concert with the operational command. This MO-Controller is located at the next higher echelon: in that way he has an overview of the group of units which he has the medical responsibility. After analysis of the task, three control levels, corresponding to three levels of processing and competence. Each level is called "a phase" and relates to a very specific level of competence. So in the “first aid” phase, the regimental MO-Controller decides the commitment of medical resources; in the" forward medical aid” phase, the MO-Controller of the higher formation organizes the most appropriate MEDEVAC. Finally, in the "strategic evacuation phase” at national level, bids for air transport and prepares reception at the base hospital. At each phase, the MO-Controller’s decisions are based on medical data.

RMT leads to two types of actions: a reasoned management priorities and organization of logistics flows. This realization leads to a more personalized driving this support for a significant gain in quality and survival. It is therefore a major breakthrough in the field of casualty

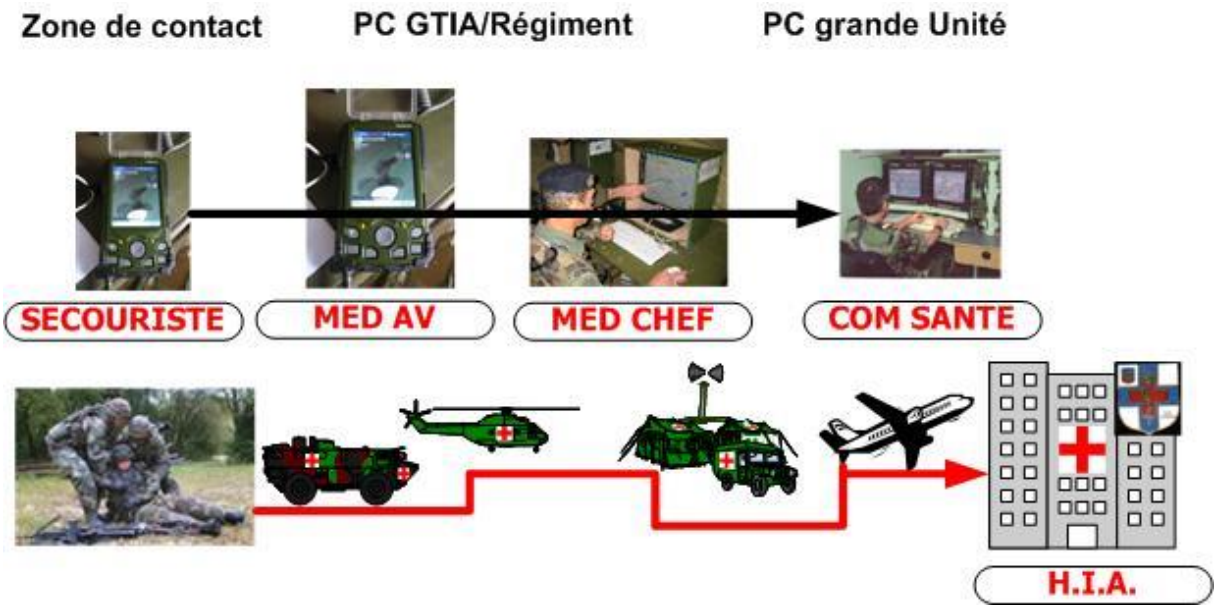

Figure 1: Casualty management and data flow.

3.0 CONCLUSION

Our studies were influenced by experience of crisis situations in the case of CORTIM, and the quality of casualty handling by SAMU for the RMT concept. We consider that operational casualty management can be enhanced in at least three areas. The first concerns improvements in the use of the available resources for managing casualties resulting from recent situations. This has led to a more effective assumption of responsibility, with a consequent improvement in prognosis for the casualty. The second relates to a better awareness of the context of decision. Sharing between several decision-makers leads to greater awareness of the context. Effectively, each control operation is based on information transmitted by players in close proximity to he casualty. In our view, this context-awareness limits errors of interpretation. Finally we can states that the RMT context put the emphasis on the casualty as an individual, and is therefore in tune with public expectations. At the conclusion of this study it would seem important to stress that the introduction of IT is not simply a matter of technical problems, but can lead to major organisational changes. The project sustains forward medico-surgical doctrine by seeking every possible advantage to be gained from technology with the objective of saving lives.